

REMARKS

Claims 1-10 are amended. Claims 1-14 remain in the Application. Reconsideration of the pending claims is respectfully requested in view of the above amendments and the following remarks.

I. Claims Rejected Under 35 U.S.C. § 103(a)

A. Claims 1-5, 9, 11, 12, and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,031,860 issued to Nitta et al ("Nitta") in view of U.S. Patent No. 6,018,541 issued to Huang ("Huang") and further in view of U.S. Patent Publication No. 2003/0063647 applied for by Yoshida et al ("Yoshida"). Applicants respectfully traverse the rejection.

To establish a *prima facie* case of obviousness, the relied upon references must teach or suggest every limitation of the claim such that the invention as a whole would have been obvious at the time the invention was made to one skilled in the art. Among other elements, amended Claim 1 recites:

“A self-mode locked multi-section semiconductor laser diode,
for generating high-frequency optical pulsation and controlling the
pulsation frequency, comprising:

a complex-coupled DFB laser section that includes a complex-coupled grating and an active structure for emitting laser light in a longitudinally single mode, where the intensity of oscillating laser light is controlled by means of the current injected to the complex-coupled DFB laser section; and

an external cavity including a phase control section and an amplifier section for controlling the phase and strength of the laser light fed back to the complex-coupled DFB laser section after round-trip through the phase control section and the amplifier section by means of the currents injected into the phase control section and the amplifier section, the phase control section having a guiding layer as a passive waveguide that controls a phase variation of feedback laser light, the amplifier section having an active structure that controls the strength of the feedback laser light, the DFB laser section and the external cavity being monolithically integrated on a single substrate, current being independently injected into each of the sections, where high-frequency optical pulsation can be generated and the pulsation frequency can be varied in a wide range according to the phase and strength of the feedback laser light.”

Applicants submit that Nitta in view of Huang and Yoshida does not teach or suggest at least these elements.

Nitta is cited for disclosing the limitations of Claim 1 except the complex-coupled DFB section. Huang is cited for disclosing a complex-coupled DFB laser waveguide. Yoshida is cited for disclosing a waveguide in the phase section being thicker than the guiding layer in the active structure. However, none of the cited references, separately or combined, teach or suggest that “controlling the phase and strength of the laser light fed back to the complex-coupled DFB laser section by means of the currents injected into the phase control section and the amplifier section, “ and “high-frequency optical pulsation can be generated and the pulsation frequency can be varied in a wide range according to the phase and strength of the feedback laser light,” as recited in amended Claim 1.

Nitta discloses an optical device that switches between two resonator modes including a TM mode and a TE multimode (col. 10, lines 3-4). The modes are switched by adjusting the phase condition of the phase adjusting region 2 (col. 10, lines 5-8). Nitta does not teach or suggest adjusting the phase and strength of the feedback laser light to vary the pulsation frequency. Rather, Nitta discloses adjusting the phase of the light to switch between two resonator modes that are characterized by different polarized waves. Nitta is completely silent on varying the pulsation frequency of the waves.

Moreover, Nitta does not teach or suggest injecting currents into the phase control section and the amplifier section for controlling the phase and strength of the feedback laser light. Rather, Nitta discloses injecting currents into the phase adjusting region to control the phase of the feedback laser light. Thus, Nitta does not teach or suggest each of the elements of amended Claim 1.

Huang and Yoshida do not cure the deficiencies of Nitta. There is nothing in Huang or Yoshida that teaches or suggests varying the pulsation frequency by injecting currents into the phase control section and the amplifier section to adjust the phase and strength of the feedback laser light. Thus, Nitta in view of Huang and further in view of Yoshida does not teach or suggest each of the elements of amended Claim 1.

Claims 2-5, 9, 11, 12, and 14 depend from Claim 1 and incorporate the limitations thereof. Thus, for at least the reasons mentioned above in regard to Claim 1, Nitta in view of Huang and further in view of Yoshida does not teach or suggest these dependent claims. Accordingly, reconsideration and withdrawal of the obviousness rejection of Claims 1-5, 9, 11, 12, and 14 are requested.

B. Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Nitta in view of Yoshida, Huang, and U.S. Patent No. 5,175,643 issued to Andrews (“Andrews”).

Claim 6 depends from Claim 1 and incorporates the limitations thereof. The Examiner cites Andrews for teaching a DFB device wherein an active region is formed between two optical guide layers. However, Andrews also does not teach or suggest varying the pulsation frequency by injecting currents into the phase control section and the amplifier section to adjust the phase and strength of the feedback laser light, as recited in based Claim 1. Thus, for at least the reasons mentioned above in regard to Claim 1, Nitta in view of Yoshida, Huang, and Andrews does not teach or suggest each element of Claim 6. Accordingly, reconsideration and withdrawal of the obviousness rejection of Claim 6 are requested.

C. Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Nitta in view of Huang, Yoshida, and U.S. Patent No. 5,177,758 issued to Oka et al. (“Oka”).

Claim 9 depends from Claim 1 and incorporates the limitations thereof. The Examiner cites Oka for teaching the alignment of the central axis. However, Oka also does not teach or suggest varying the pulsation frequency by injecting currents into the phase control section and the amplifier section to adjust the phase and strength of the feedback laser light, as recited in based Claim 1. Thus, for at least the reasons mentioned above in regard to Claim 1, Nitta in view of Oka does not teach or suggest each element of Claim 9. Accordingly, reconsideration and withdrawal of the obviousness rejection of Claim 9 are requested.

D. Claim 13 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Nitta in view of U.S. Patent No. 4,995,048 issued to Kuindersma et al. (“Kuindersma”).

Claim 13 depends from Claim 1 and incorporates the limitations thereof. The Examiner cites Kuindersma for teaching a grated laser structure incorporated monolithically with a phase control section and an amplifier section, wherein the amplifier section is located between the

grating and the phase control sections. However, Kuindersma does not teach or suggest varying the pulsation frequency by injecting currents into the phase control section and the amplifier section to adjust the phase and strength of the feedback laser light as recited in amended Claim 1. Thus, for at least the reasons mentioned above in regard to Claim 1, Nitta in view of Kuindersma does not teach or suggest each element of Claim 13. Accordingly, reconsideration and withdrawal of the obviousness rejection of Claim 13 are requested.

II. Allowable Subject Matter

Applicants note with appreciation the Examiner's indication that Claims 7, 8, and 10 would be allowable if rewritten in independent form. Applicants respectfully submit that the amendment to Claim 1 has obviated the need to rewrite these claims. As Claim 1 is in condition for allowance, its dependent claims are allowable at least for the reasons mentioned in regard to Claim 1. Accordingly, reconsideration and withdrawal of the objection of Claims 7, 8, and 10 are requested.

CONCLUSION

In view of the foregoing, it is believed that all claims now pending patentability define the subject invention over the prior art of record and are in condition for allowance and such action is earnestly solicited at the earliest possible date.

Respectfully submitted,

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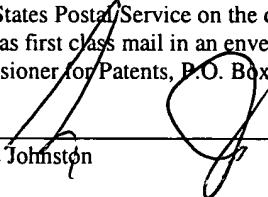
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